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Tunneling Spectroscopy of the Colossal Magnetoresistive $La_{0.7}Ca_{0.3}MnO_3$ Epitaxial Films: Evidence of Half-Metallic Band-Structure in the Ferromagnetic State

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ABSTRACT:

We present tunneling spectroscopy data taken with a low-temperature scanning tunneling microscope on epitaxial films of the colossal magnetoresitive (CMR) perovskite $La_{0.7}Ca_{0.3}MnO_3$. At 77K, well below the Curie temperature, the normalized tunneling conductance (dI/dV)(I/V)-l exhibits pronounce.d peaks and gap-like structures, bearing notable resemblance to the half-metallic density-of-states spectrum calculated for the itinerant bands in the ferromagnetic state[1]. These characteristics arc. absent at room temperature in the paramagnetic state, as we]] as in the undoped compound $LaMnO_3$ which shows no CMR behavior, We discuss these spectral differences in the context of exchange interaction between the itinerant electrons and its role for CMR in the manganites.

REFERENCES:

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